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THE USE OF EXPERT OPINION, QUALITY AND REPUTATION INDICATORS BY CONSUMERS: EVIDENCE FROM THE FRENCH VAULTING STALLION SEMEN MARKET.

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Abstract

We build a model inspired by the standard hedonic approach developed by Rosen (1974) and completed by Landon and Smith (1997, 1998) to analyze the price of French vaulting stallion semen in 2004. We show that reputation, modeled as an endogenous factor, plays a less important role than information on true quality for the explanation of price dispersion. This result is explained by the fact that information on studhorses is not only available but also reliable, insofar as the quality of a stallion is stable over time, contrary to non durable products like wine or cigars. This explains also why consumers on this market do not use expert opinions to make their choices.

Keywords

Expert opinion; quality; reputation; price; stallion.

JEL classification

L15; L66; Z1.

1. INTRODUCTION

Lancaster's theory (1966) assumes that satisfaction is derived from the product characteristics rather from the products themselves. Thus, the consumer's demand from goods and services can be viewed as a derived demand, insofar as goods and services are "inputs" to obtain desired attributes. On the basis of the "new" consumer demand theory developed by Lancaster, Rosen (1974) and Lucas (1975, 1977) suggested a method grounded on commodity differentiation for analyzing the "hedonic" price of a characteristic embodied in a commodity. Hedonic price analysis is based on the hypothesis that every good can be treated as a bundle of attributes that define product quality and that differentiate closely related products. For any given good, let this set of characteristics be ordered and denoted by $x = (x_1, \ldots, x_K)'$. It is assumed that the preferences of the consumers with respect to any good are solely determined by its corresponding attributes vector. Furthermore, it is assumed that, for any good, there is a functional relationship f between its price P and its characteristics vector x, i.e. $P = f(x)$. This function specifies the hedonic relationship or hedonic regression typical for the good. Based on the functional relationship $P = f(x)$, the important concept of implicit or hedonic prices can be introduced. These prices are defined to be the partial derivatives of the hedonic function (1): the hedonic price $\partial f/\partial x_k(x)$ indicates how much the price P of a good changes if this good is, ceteris paribus, endowed with an additional unity of the characteristic x_k ($k=1,\ldots,K$). Thus, the observed market price should be the sum of implicit prices paid for each quality attribute. For practical applications of the hedonic relationship in price statistics, the main problems are to determine the characteristics vector typical of a good and to specify the hedonic function.

Hedonic analysis was used to analyze various fields, for example to explain discrimination in matchmaking (Vaillant, 2004), evaluation of human life (Harrant, 2002), measuring the social value of local public goods (Gravel, Michelangeli and Trannoy, 2006), the impact of the regulation of the cable television industry (Anstine, 2006), or pricing of durable goods, such as automobiles [see e.g., Murray and Sarantis (1999), Couton and Gardes], housing [see e.g., Muth (1961), Brookshire (1981), Can (1992), Marchand and Skiri (1995)] or personal computers [see e.g., Chow (1967), Berndt and Griliches (1990), Baker (1997)]. In recent years, researchers have also apply hedonic pricing method for some nondurable goods, such as restaurant meals [Falvey, Fried and Richards, (1991), Gergaud and Chossat (2002)] or wine [Golan and Shalit (1993), Oczkowski (1994), Nerlove (1995), Gergaud and Vignes (2000)]. Freccia, Jacobsen and Kilby (2003) and Combris, Lecocq and Visser (1997) used the hedonic method to measure both price and quality on the hand-rolled cigars market and on the Bordeaux wine market respectively. Cigars and wines have two important features in common:

First, their true qualities are not known before purchase [see Shapiro (1983) and Allen (1984)]. In such a case, expert's rating may be an important determinant of price [Ashenfelter and Jones, (2000)] and success [Ginsburgh and Van Ours, (2003)]. As a result, an increasing number of guidebooks and other consumer reports are available and benefit from an important audience (Gergaud and Chossat, 2002). In the light of Shapiro's analysis (1983), some authors, like Landon and Smith (1998) in the area of wine or Vaillant and Livat (2005) in the area of cigars, have also shown that reputation of products may also play a substantial role, and influence the consumers decisions. However, as Landon and Smith (1997) stress it, the empirical reputation literature is extremely limited; it concerns the relation between prices and individual reputation [Peltzman (1985), Borenstein and Zimmerman (1988)], collective reputation [Jarrell and Peltzman, (1985)] or brand loyalty [Mannering and Winston, (1985), (1991)]. In point of fact, Landon and Smith (1997, 1998) presented an original empirical analysis focusing on reputation in addition to sensory quality attributes. In both papers, they estimated hedonic price functions for Bordeaux wine, studying the impact of current quality as well as reputation indicators on consumer behavior. They concluded that reputation indicators have a large impact on consumer's willingness to pay: first, an established reputation seems considerably more important than short-term quality improvements; second, the omission of reputation indicators tends to overstate the impact of current quality on consumer behavior.

The second important feature that wines and cigars have in common is that not only true quality can not be observed before purchase, but it is likely to change each year, due to meteorological factors or other exogenous factors influencing production. How do consumers behave in the presence of information on a product featured by a less unstable quality? Does reputation play the same role? What is the importance attached to expert opinion in such a circumstance? In this paper, we try to answer these questions by analyzing the French stallion vaulting semen market. We build a model inspired by the standard hedonic approach developed by Rosen (1974) and completed by Landon and Smith (1997, 1998). In this perspective, the equilibrium price P_i of the stallion semen, given in euros, is assumed to be a function of its genetic quality, its reputation and other characteristics. In the spirit of Nelson, Siegfried and Howell (1992), who explore the relationship between a differentiated brand's market share and its price in the context of a model that recognizes the endogeneity of the brand's advertising behavior and pricing decisions, reputation is modeled as an endogenous factor in our model. The data we use stem from two related sources, available in the bookstores: *Le guide des étalons 2004* ("The stallions guide 2004") and *L'éperon: hors série de l'élevage 2004* ("*The spur*: horse breeding in 2004, special edition"). The data concern the 215 studhorses on the French market in 2004.

The paper is organized as follows: In section 2, we describe the empirical model and the data. Estimation results are discussed in Section 3. Section 4 concludes.

2. Empirical specification and data

The equation describing the price P_i of the semen of a stallion i takes the following form:

$$P_i = p\left(Q_i, RS_i, X_i, Z_i\right) + \varepsilon_i^1 \qquad (1)$$

where ε_i^1 is a random term with usual properties.

The variable Q_i designates the genetic quality of the stallion i. More precisely, Q_i is a genetic cumulative index named *BLUP* ("Best Linear Unbiased Predictor"), calculated by *Les Harras Nationaux* (The French public stud farm). This index takes into account the vaulting performances of the related of the stallion (ancestral, descendants and collaterals) and its own annual vaulting performances, but the method of calculus is not disclosed. In the data, no information can be used to distinguish the performances the stallion itself from those of its related. The stallions whose *BLUP* is positive are assumed to improve equines (in the sample, only one stallion is not in this case). This variable is associated with a coefficient comprised between 0 and 1, indicating the reliability of the genetic quality index. It is commonly admitted that the quality index can be considered as a good one if and only if the coefficient exceeds 0.60. Only stallions in this case will be considered in the estimations presented above.

The variable RS_i measures the demand for the reproductive services provided by the stallion, i.e. the number of successful coverings it realized before the year 2004. This variable is built as the product of the total number of coverings (NC_i) and the rate of fertility (F_i), assumed to measure the empirical probability of success of a covering. RS_i may be used as an estimation of the reputation of the stallion, insofar as good reputed stallions will be more required by buyers, other things equal.

Four variables relating to specific qualities are included in the vector X_i. These ones, coded by experts of "*Le guide de l'élevage 2004*" on a scale of 1 to 5, concern the conformation of the stallion, its temperament (is the stallion more or less good- or ill-natured?), its style in vaulting (its ability to jump) and its strength and potency (its physical abilities and the tension of its back). Finally Z_i is a vector of "taste factors" measured by dummy variables, coded as 1 if the stallion belongs to a French public stud farm ($FPSF_i$), to a French private horse breeder ($FRPHB_i$), or to a foreign private horse breeder ($FOPHB_i$). Definitions and descriptive statistics are shown in Table 1.

[Table 1]

While the quality Q_i of a stallion is necessarily a given (exogenous) factor, insofar as it is not possible to distinguish the sports quality of the stallion from the sports quality of its related, on the other hand the reputation variable RS_i may be treated as an endogenous factor. Thus, we model the total number of mares the stallion serviced, i.e. the demand for the reproductive services it provides, as a function of the total number of coverings realized before the year 2004 (NC_i), its age (Age_i) and its genetic quality (Q_i). The equation describing the reputation RS_i takes the following form:

$$RS_i = r\left(NC_i, Age_i, Q_i\right) + \varepsilon_i^2 \qquad (2)$$

where ε_i^2 is a random term with usual properties.

We introduced the total number of coverings as independent variable in Equation (2) insofar as stallions that serviced a greater number of mares should logically be featured by a higher number of successful coverings. The presence of the age variable controls for the fact that the older the stallion, the more it has reproduced. Finally, we assume that stallions featured by a high genetic quality level are more demanded. Descriptive statistics and definitions are shown in Table 2.

[Table 2]

The price variable is not included as a regressor in Equation (2) because it designates the price of the stallion semen in 2004, and yet the reputation variable is built following a cumulative index. Moreover, we do not have information about the price evolution of the stallions.

The relation between price and reputation can be analyzed by jointly estimating a system of the price equation (1) and the reputation equation (2). The hedonic price equation contains an endogenous variable among the explanatory variables (the number of successful coverings). All dependent variables are explicitly endogenous to the system and are treated as being correlated with the disturbances in the system's equations (ε_i^1 and ε_i^2). All other variables in the system are treated as exogenous to the system and uncorrelated with the disturbances. Estimation is via two-stage least squares (2SLS). We performed tests suggested by Hausman (1978) of these full models and discovered that we could not reject that OLS is an adequate estimating method.

3. Results and discussion.

Because the genetic quality index of the stallion and its specific qualities coded by experts are correlated (see Table 3), three systems were estimated (noted System SI, System SII and System SIII).

[Table 3]

Estimation results of System SI are shown in Table 4a. In System SII, the coding variables X_i^1, X_i^2, X_i^3 and X_i^4 have been removed from Equation (1), whereas the variable

Q_i has been removing from Equation (1) in System SIII. Estimation results are shown in Table 4b.

[Table 4a]

[Table 4b]

The coefficients of the price equation measure the partial derivatives of Equation (1) with respect to each characteristic, i.e. the marginal willingness to pay of consumers for each characteristic. It appears that the genetic quality of a stallion has a statistically significant positive effect on the price of its semen (+35 by further index unit), both in OLS and 2SLS specifications. This means that the price difference between a stallion whose *BLUP* is equal to zero and a very "good" stallion, for example a stallion whose *BLUP* is equal to 30, is almost 1050 . This difference is higher when the specific quality indicators are suppressed from Equation (1) (this estimated value of the coefficient is then +49), confirming one of the findings of Landon and Smith (1997, 1998): the omission of reputation indicators tends to overstate the impact of current quality on consumer behaviour. The suppression of the variables included in the vector X_i also increases the estimated value of the impact of reputation index on price, suggesting that fertile stallions are more demanded: the measured effect changes significantly from 1 to 1.4. Let consider the first column of Table 4a: a one-point increase in the genetic quality index has the same impact on price than 33 further successful coverings (35.81 vs. 35.64). In other words, insofar as the scales of the number of successful coverings and quality index are very different (see Table 1), this means that true quality is a more important factor than reputation in the explanation of price on the French vaulting stallion market. Genetics being featured by radical uncertainty, this result proves that expectations of consumers on this market result from scientific information rather than from induced experience. Let remark that estimates of Equation (2) (both in Table 4a and Table 4b) confirm that the genetic quality of a stallion play a positive (but statistically insignificant) role in the explanation of the reputation of a stallion (almost +0.28 by further BLUP unit). The age of older stallions seems not significantly correlated with the number of successful coverings. Finally, and logically, stallions that serviced a greater number of mares are logically featured by a higher number of successful coverings (let remark that the t-ratio is enormous: 105.03).

It appears that the price of the semen of a stallion significantly increases between 260 and 328 by further evaluation unity of strength. Other quality characteristics coded by experts (conformation, temperament and style) play also a positive role in the explanation of price, but these ones are not statistically significant. This proves that consumers do not use information provided by experts to make their choices when information linked to objective characteristics (genetic quality) and/or reputation are available.

Finally, Table 3 confirms that the price of semen provided by French public stud farm is (often significantly) lower than those provided by foreign private horse breeders. A price difference may also be deduced between foreign private horse breeders and French private horse breeders, but this one is never statistically significant. Due to the little number of observations related to foreign private horse breeders, the main information from the analysis of estimates of the variables $FPSF_i$ and $FRPHB_i$ in Table 3 is that semen of stallions from French public stud farm is less costly that semen of stallions from French private horse breeders. This difference may be explained by the fact that private owners bear the expenses of the equipment to carry out covering, contrary to French public stud farm, subsidized by taxpayers. Moreover, it is likely that public and private owners have not the same objective, insofar as French public stud farm try explicitly to improve equines. Thus, they do not use a discrimination based on price, but select their clients on the basis of the characteristics of their brood mare.

4. Concluding remarks.

Our results do partly confirm the findings of Landon and Smith (1997, 1998). On the one hand, using a radically different dataset we show that the omission of reputation indicators tends to overstate the impact of current quality on consumer behaviour. On the other, it seems that reputation is less important than information on quality on the French vaulting stallion semen market. This phenomenon may easily be explained thanks to Shapiro's analysis: the concept of reputation defined as a quality indicator is only evident in an imperfect information environment. Nevertheless, in the stallion semen market the information on studhorses is not only available but also reliable, insofar as the quality of a stallion is stable over time, contrary to products like wine or cigars. This explains also why consumers on this market do not use expert opinions to make their choices.

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TABLES

Table 1. Definitions and descriptive statistics of the variables used in the price equation.

Variable	Definition	Mean	Std. Dev.
P_i	Price of the covering, in euros	1094.25	879.73
Q_i	Expert rating of the genetic value of the stallion	18.44	6.67
C_i	Number of coverings before 2004	369.35	348.95
X_i^1	Scale (1-5) measuring the conformation of the stallion	3.749	0.582
X_i^2	Scale (1-5) measuring the temperament of the stallion	3.961	0.685
X_i^3	Scale (1-5) measuring the style of the stallion	3.985	0.567
X_i^4	Scale (1-5) measuring the strength and the tension of the stallion's back	3.966	0.669
$FPSF_i$	Belongs to a French public stud farm =1; other =0	0.455	0.499
$FRPHB_i$	Belongs to a French private horse breeder =1; other =0.	0.485	0.501
$FOPHB_i$	Belongs to a foreign private horse breeder =1; other =0.	0.05	0.238

Table 2. Definitions and descriptive statistics of the variables used in the reputation equation.

Variable	Definition	Mean	Std. Dev.
F_i	Rate of successful coverings	0.653	6.141
Age_i	Age of the stallion in 2004, in years	14.535	4.937

Table 3. Spearman correlation matrix.

	Q_i	X_i^1	X_i^2	X_i^3	X_i^4
Q_i	1				
X_i^1	-.1045	1			
X_i^2	.1030	.1056	1		
X_i^3	.2889*	.1205	.3682*	1	
X_i^4	.2507*	.0043	.1374	.3967*	1

*: significant at the 1% level.

Table 4a. Estimation results (System SI).

	2SLS		OLS	
	Coef.	**t**	**Coef.**	**t**
Price equation				
RS_i	1.08	3.53***	1.03	3.38***
$FPSF_i$	-986.78	-1.7*	-971.41	-1.67
$FRPHB_i$	-216.16	-0.38	-205.10	-0.36
Q_i	35.81	2.93***	35.77	2.93***
X_i^1	168.77	1.3	173.46	1.34
X_i^2	58.49	0.54	63.45	0.59
X_i^3	205.24	1.36	206.47	1.37
X_i^4	260.04	2.27**	263.24	2.3**
Intercept	-1958.48	-1.93*	-2007.68	-1.98**
Adjusted R²	.494		.494	
Fisher	13.91 (.00)		13.78 (.00)	
Hausman	2.42 (.12)			
Successful covering equation				
S_i	.72	105.03***	.72	112.07***
Age_i	-.49	-1.02	-.53	-1.15
Q_i	.28	.72	.25	.74
Intercept	-19.32	-1.84*	-19.77	-2.06**
Adjusted R²	.989		.989	
Fisher	3698.84 (.00)		4192.13 (.00)	

*: significant at the 10% level; **: significant at the 5% level; ***: significant at the 1% level.

Table 4b. Estimation results (System SII and System SIII).

	2SLS		OLS		2SLS		OLS	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Price equation								
RS_i	1.39	4.97***	1.34	4.81***	1.06	3.35***	0.99	3.17***
$FPSF_i$	-1383.09	-2.37**	-1374.76	-2.36**	-833.91	-1.39	-807.20	-1.35
$FRPHB_i$	-398.41	-0.68	-391.40	-0.67	-99.75	-.17	-85.77	-0.15
Q_i	49.63	4.32***	49.76	4.33***				
X_i^1					133.69	1.00	153.74	1.18
X_i^2					60.32	.54	67.62	0.61
X_i^3					321.95	2.14**	326.46	2.18**
X_i^4					328.41	2.84***	325.40	2.83***
Intercept	710.01	1.19	718.59	1.2	-2077.52	-1.99**	-2181.15	-2.1**
Adjusted R²	.434		.415		.455		.421	
Fisher	23.24		22.85		13.75		13.66	
Hausman	3.48 (.06)				inconsistent			
Successful coverings equation								
S_i	.715	107.88***	.72	112.07***	.72	105.03***	.72	112.07***
Age_i	-.50	-1.05	-.53	-1.15	-.49	-1.02	-.53	-1.15
Q_i	.33	.86	.25	.74	.27	.72	.25	.74
Intercept	-19.36	-1.85*	-19.77	-2.06**	-19.32	-1.84*	-19.77	-2.06**
Adjusted R²	.989		.989		.989		.989	
Fisher	3905.9		4192.13 (.00)		3698.74		4192.13 (.00)	

*: significant at the 10% level; **: significant at the 5% level; ***: significant at the 1% level.